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MicroPatent Report

Report Summary:

Name of Session/Report:
Report Created: 2004-03-24
Number of records selected: 1

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JP01219063A MicroPatent Report

HIGHLY DENSE SILICON NITRIDE SINTERED BODY AND ITS PRODUCTION

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[21] Application No.: JP63045433

[22] Filed: 19880227

[43] Published: 19890901

[No drawing]

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[57] Abstract:

PURPOSE: To improve chemical durability, abrasion resistance, rolling life, etc., of a sintered silicon nitride by mixing a raw Si_3N_4 with a sintering additive in a specified proportion, and calcining after crushing, granulating, and molding said mixture. CONSTITUTION: (A) Si_3N_4 powder, (B) at least one kind of sintering additive selected from oxides of rare earth elements, ZrO_2, oxides of alkaline earth metals, and Al_2O_3 are mixed in a proportion that a weight ratio of a sum or a content of SiO_2 in the component (A) and a content of SiO_2 in the component (B) to the content of metal oxides other than SiO_2 in the component (B) is 1:4W4:1. The mixture is then crushed, granulated, and then dried forcibly, and a molded body is obtd. by molding the dried product. Then, the molded body is calcined primarily at 1,400W1,600°C in N_2 atmosphere under normal pressure, then pressed hydrostatically at 1,500W1,900°C in N_2 atmosphere under 200W1,700atm. Thus a highly dense sintered Si_3N_4 having ≤0.5% porosity, ≥15Gpa Knoop hardness (300g load), and 4:1W1:4 ratio of SiO_2 in grain boundary glass phase compsn. to metal oxides other than SiO_2, is obtd.COPYRIGHT: (C)1989,JPO&Japio

[51] Int'l Class: C04B03558